ThermoFisher SCIENTIFIC

The world leader in serving science

Legacy IEC Centrifuge Product Training

Micromax Family

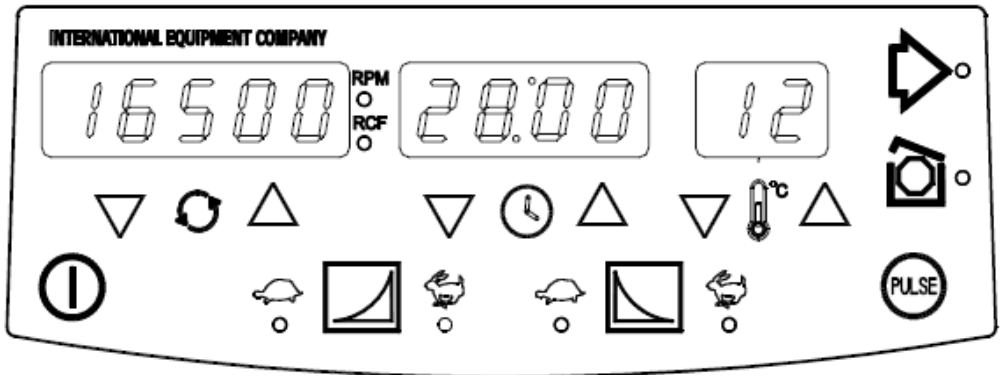
Micromax Family Products

- IEC Microlite/Microlite RF = Forma MicroCentrifuge /RF
  Membrane Panel, Color, Brand
- IEC Micromax/MicromaxRF = Forma Micromax HP /REF
  Membrane Panel, Color, Brand
- IEC Micromax/MicromaxRF = IEC Microlite/Microlite RF
  E-Prom (Speed)

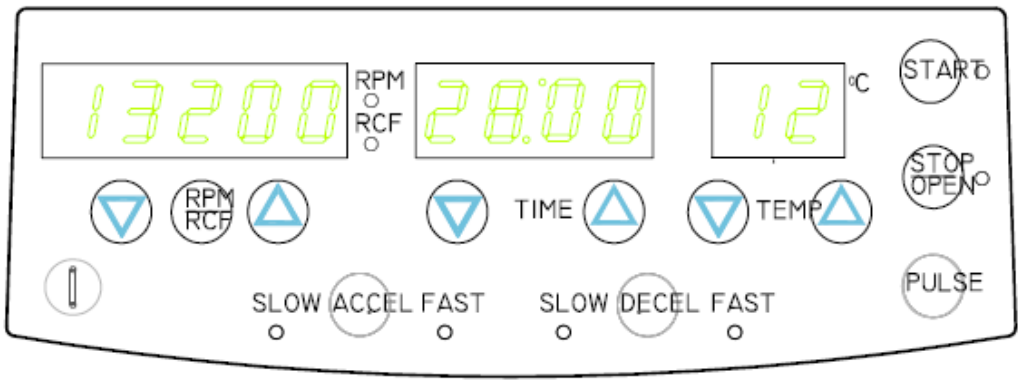
MicroMax Family Crossover Table

035900F	MICROMAX VENT. 120V 60HZ	▶	055900F	THERMO FORMA MMAX VENT HP 120V
035910F	MICROMAX VENT. 220-240 50/60HZ	▶	055910F	THERMO FORMA MMAX VENT HP 220/240V 50/60HZ
035920F	MICROMAX REFRIGERATED 120V 60HZ	▶	055920F	THERMO FORMA REF MMAX HP 120V 60HZ
035930F	MICROMAX REFRIGERATED 220-240V 50HZ	▶	055930F	THERMO FORMA REF MMAX HP 220/240V 50HZ
035940F	MICROMAX REFRIGERATED 220/230V 60HZ	▶	055940F	THERMO FORMA REF MMAX HP 220/230V 60HZ
035950F	MICROMAX, VENT. 100V - JAPANESE		—	**NA**
035960F	MICROMAX, REFRIGERATED 100V - JAPANESE		—	**NA**
035800F	MICROLITE (120V / 60HZ)	▶	055200F	FORMA MICRO VENTILATED, 120V, 60HZ
03580FF	MICROLITE WITH ROTOR (120V / 60HZ)		—	**NA**
035810F	MICROLITE (220-240V, 50/60HZ)	▶	055210F	FORMA MICRO VENTILATED, 220-240, 50/60HZ
035820F	MICROLITE RF (120V / 60HZ)	▶	055220F	FORMA MICRO REFRIGERATED, 120V, 60HZ
03582FF	MICROLITE RF WITH ROTOR (120V / 60HZ)		—	**NA**
035830F	MICROLITE RF (220 - 240V / 50 HZ)	▶	055230F	FORMA MICRO REFRIGERATED , 220-240V, 50HZ
	NA		055240F	FORMA MICRO REFRIGERATED, 220-230V, 60HZ
	NA		055250F	FORMA MICRO VENTILATED, 100V - JAPANESE
	NA		055260F	FORMA MICRO REFRIGERATED, 100V - JAPANESE

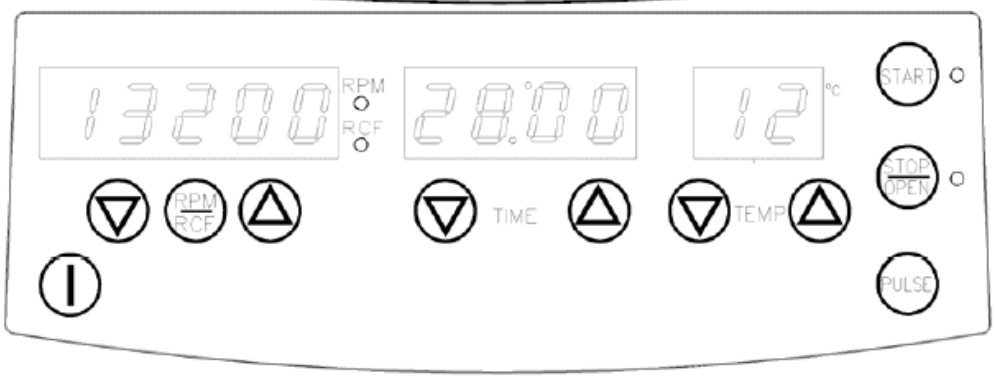
Membrane Panel



IEC Microlite/Micromax RF
Ventilated = No Temp Display



Forma Ref Micromax HP
Ventilated = No Temp Display



Forma Microcentrifuge
Ventilated = No Temp Display

Micromax Family Features

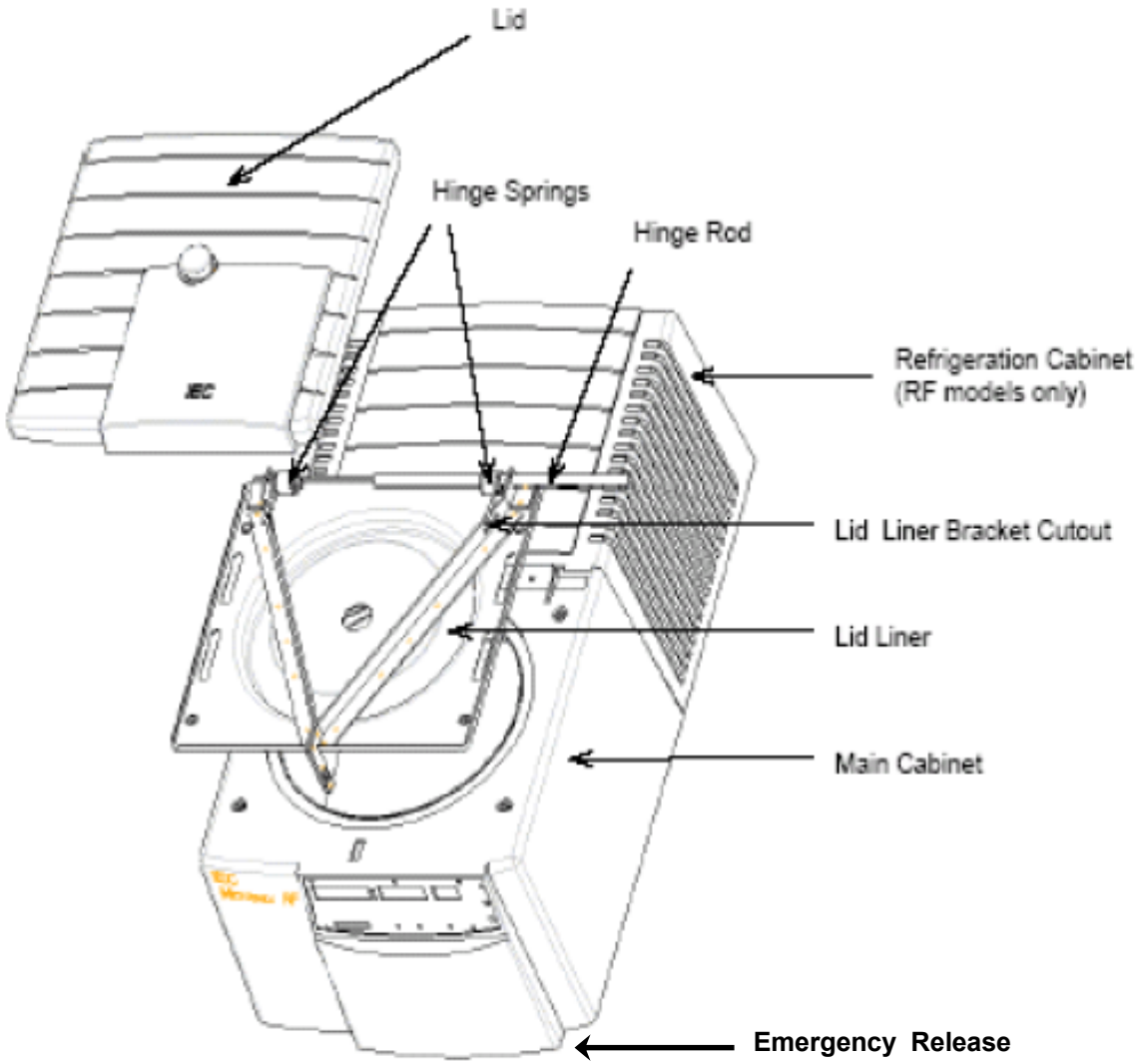
- Brushless DC Motor
- No Imbalance Detector
- Fixed Angle Rotors Only
- Fused in P.E.M. (Power Entry Module)
- High Pressure Switch (Refrigerated Models Only)
- Audible Alarm
  - 2 Beeps = Power On
  - 3 Beeps = End of Spin
  - 3 Beeps = Warning Condition

Component Access

Cover Removal

1. Open the cover and unplug the centrifuge.
2. Remove (4) Phillips head screws which attach blue lid to lid liner.
3. Remove the blue lid, while supporting the lid liner.
4. With lid liner raised to remove pressure from the hinge springs, remove spring arms from the cutouts in the lid liner bracket.
5. Remove hinge rod by sliding to the right or left, and remove springs and lid liner.

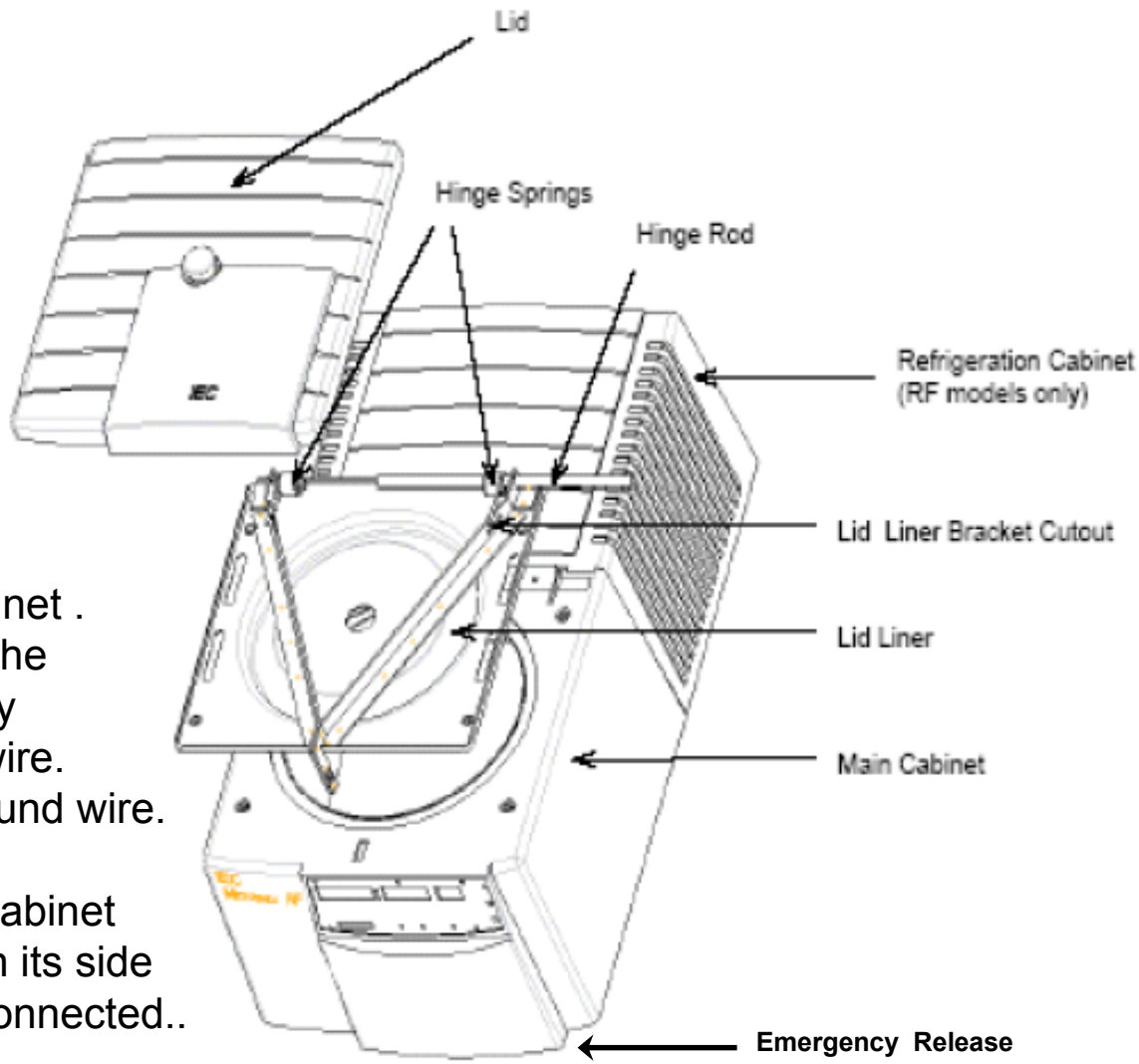
Note - the two hinge springs are not identical, and can only be properly installed one way.



Component Access

Main Cabinet (All Units)

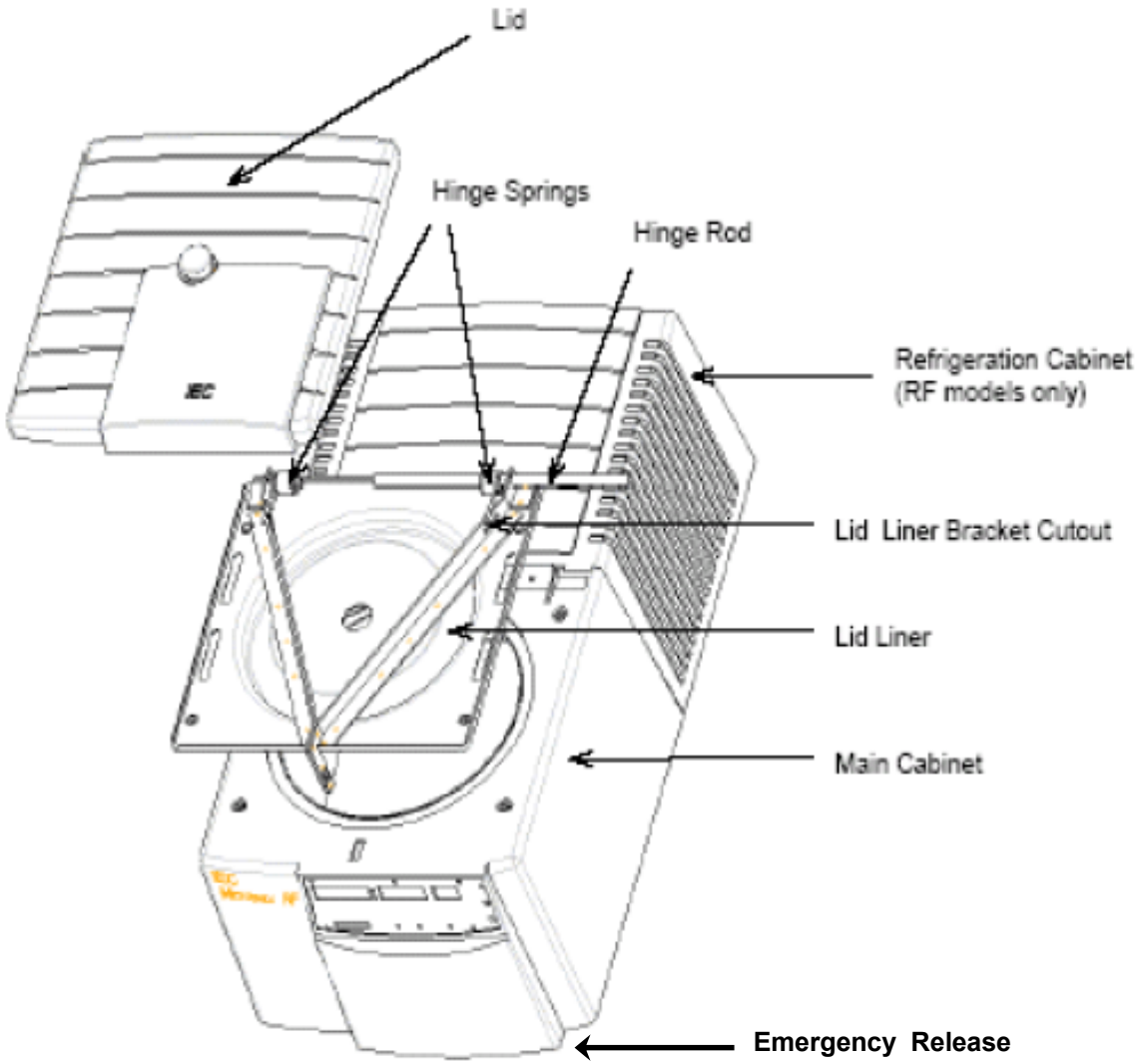
1. Remove lid
2. Remove (4) screws located on the top of the cabinet. (This may require removal of a warning label. Be sure to re-apply the label when finished.)
3. On non-refrigerated units, remove (2) screws located on the back of the cabinet.
   On RF models, remove rear cabinet .
4. Gently lift cabinet partially off of the unit to allow access to the display board ribbon cable and ground wire.
5. Disconnect ribbon cable and ground wire.
6. Remove cabinet.
   If operation is required with the cabinet removed, lie the cabinet down on its side while keeping the display PCB connected..



Component Access

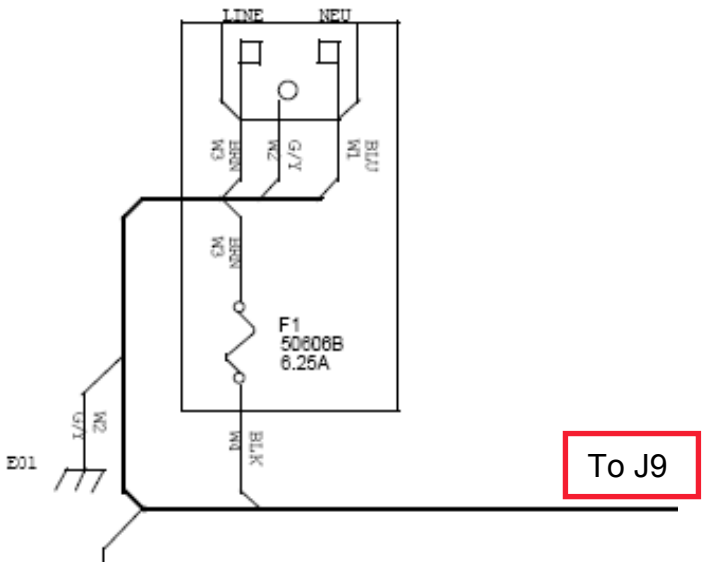
Rear Cabinet Section (Refrigerated Units Only)

1. Unplug the centrifuge.
2. Remove (2) screws located on the back of the rear cabinet section.
3. Lift the back of the rear cabinet section away from the base plate of the unit.
4. Remove the rear cabinet section by gently disengaging the two tabs that connect the rear cabinet section to the front cabinet section.

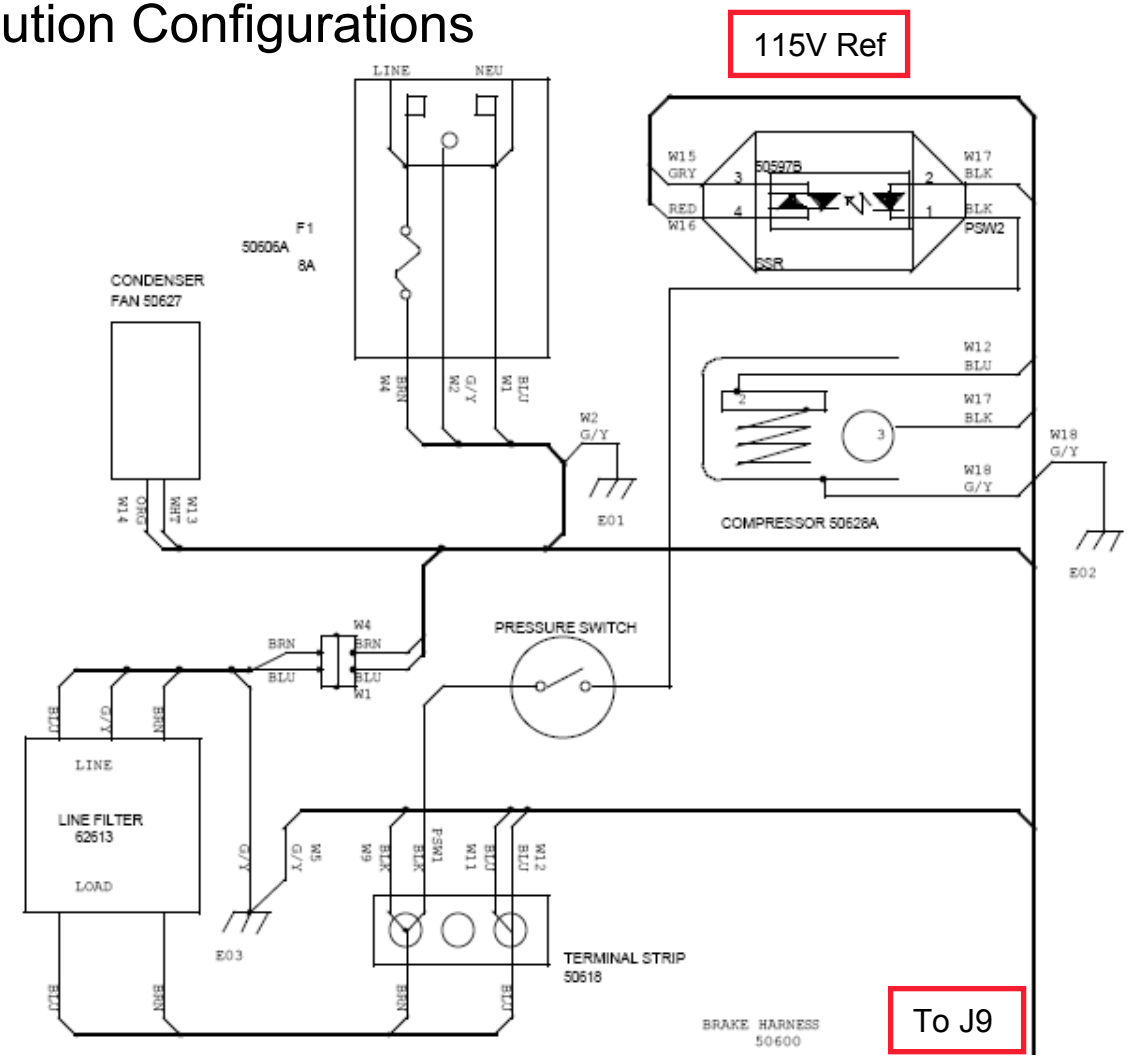


Micromax Power Distribution

- 4 Basic AC Power Distribution Configurations



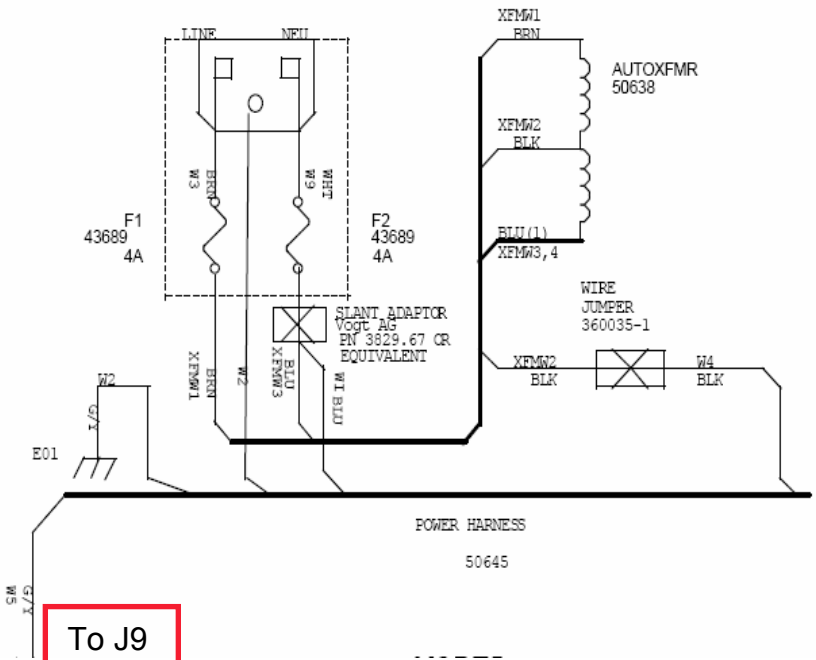
115V Non-Ref



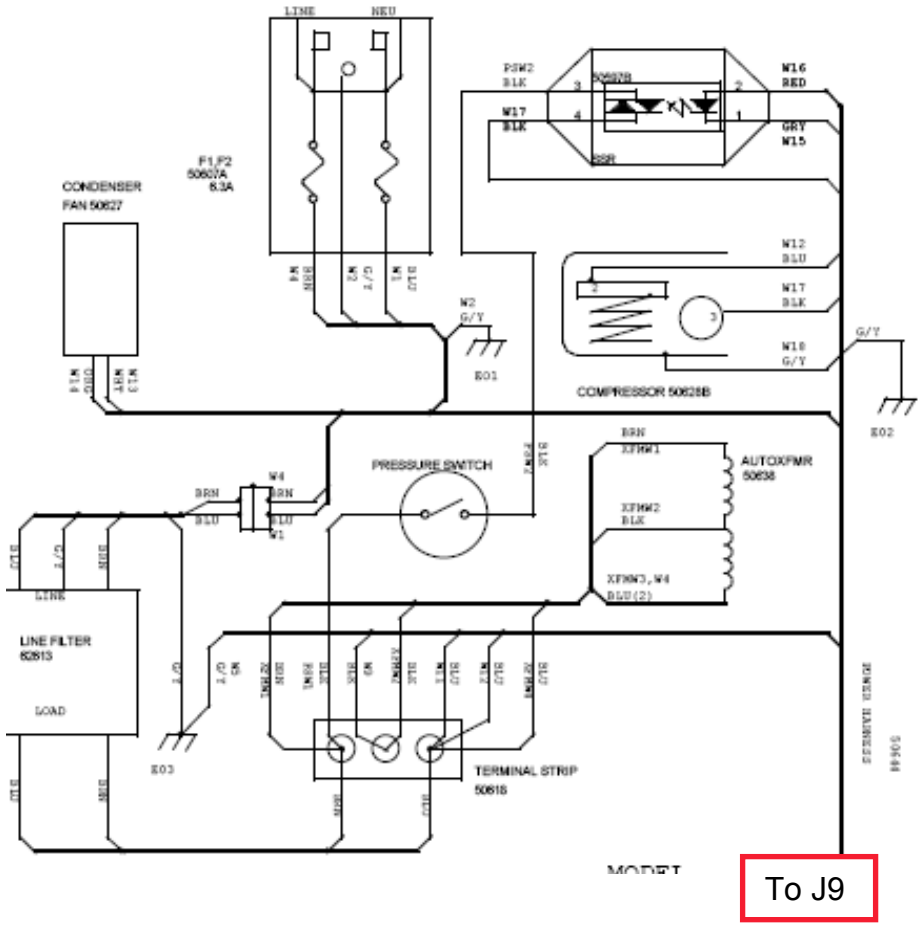
Micromax Power Distribution

- 4 Basic AC Power Distribution Configurations

230V Non Ref

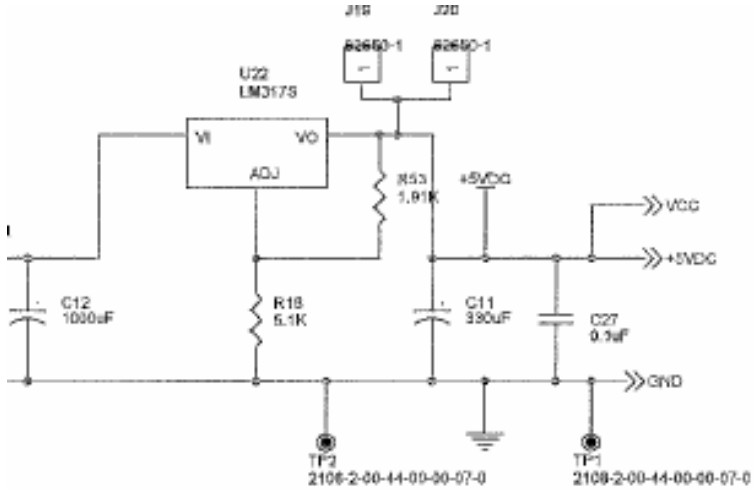


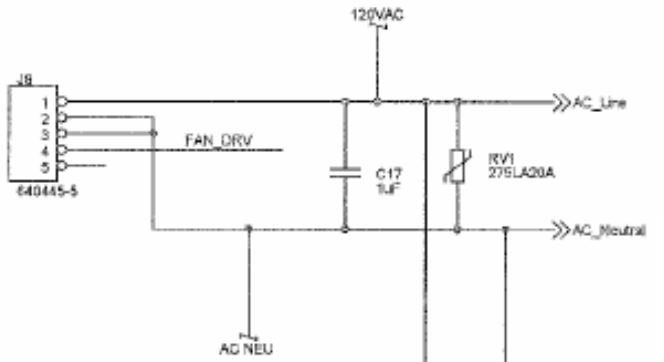
230V Ref



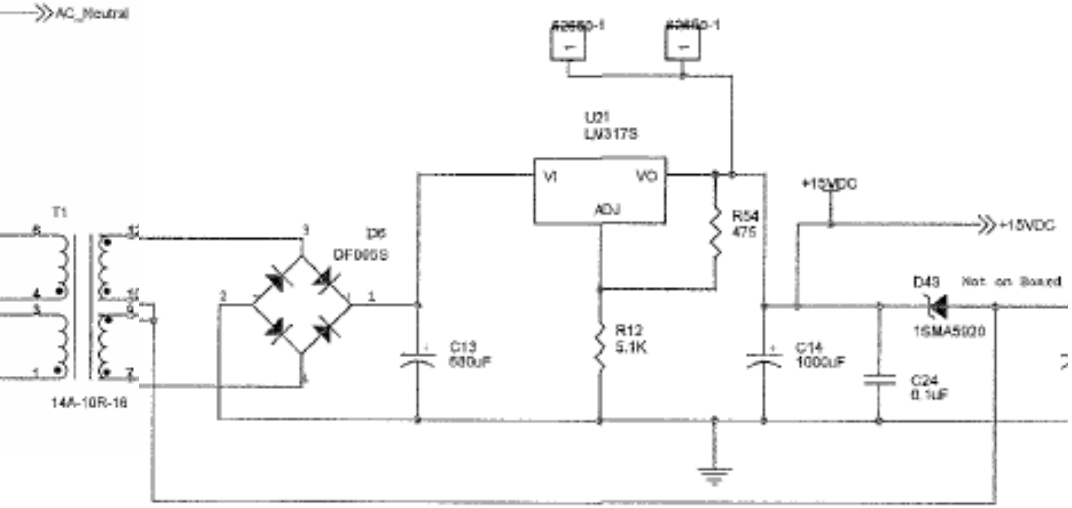
Control PCB Power Distribution

- 115V AC Systems
  - J9 common to new and old PCB
  - 5 +15V circuits different
  - DC gnd isolated. <> 60V different / chassis



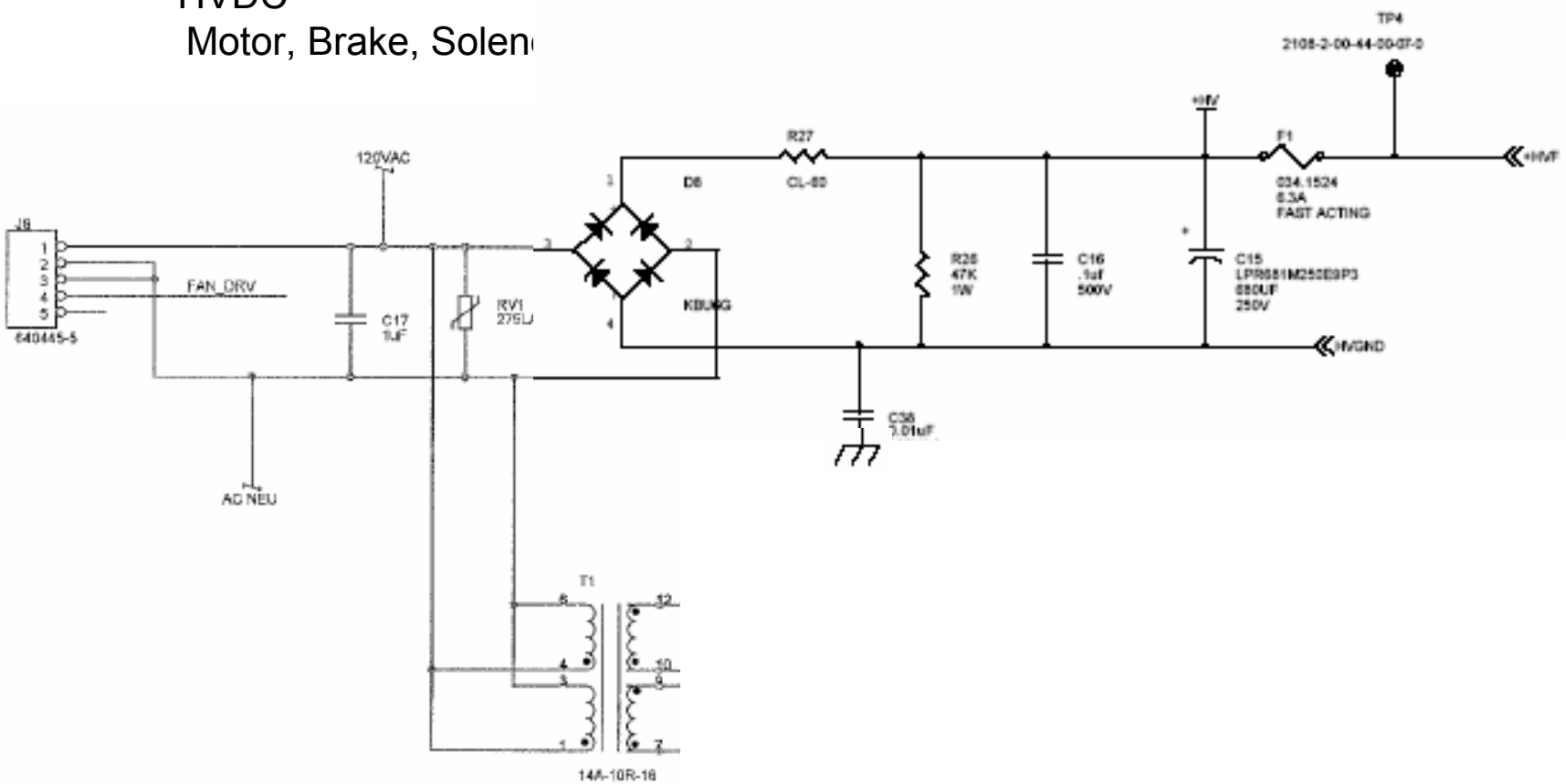


J9 Pin 1 & 2
115V In



Control PCB Power Distribution

- 115V AC Systems
  - HVDC
    Motor, Brake, Solen

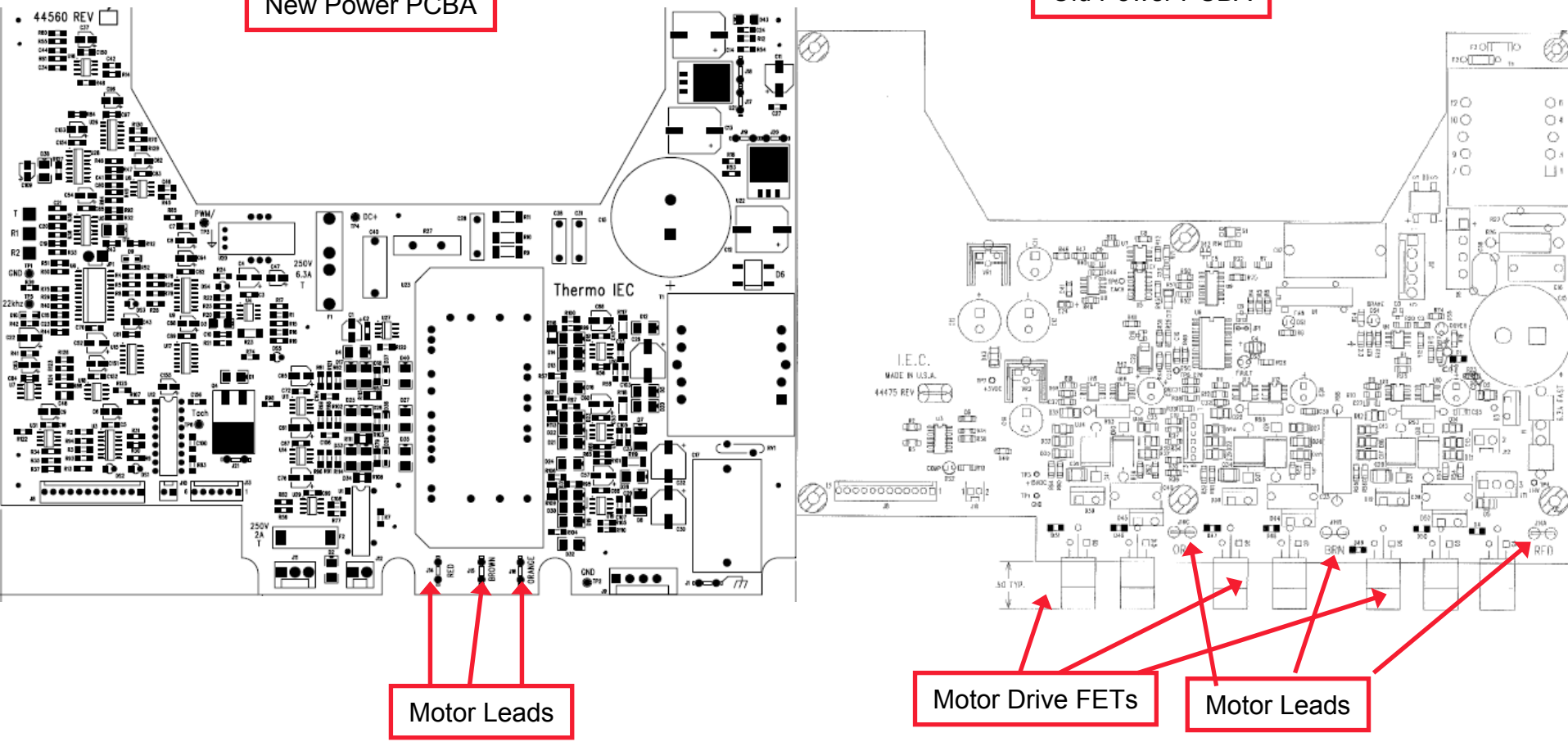


Power / Control PCB

- The Power circuit board develops the motor and logic power supply voltage. In addition to the motor drive circuit, the power board supports the following systems:

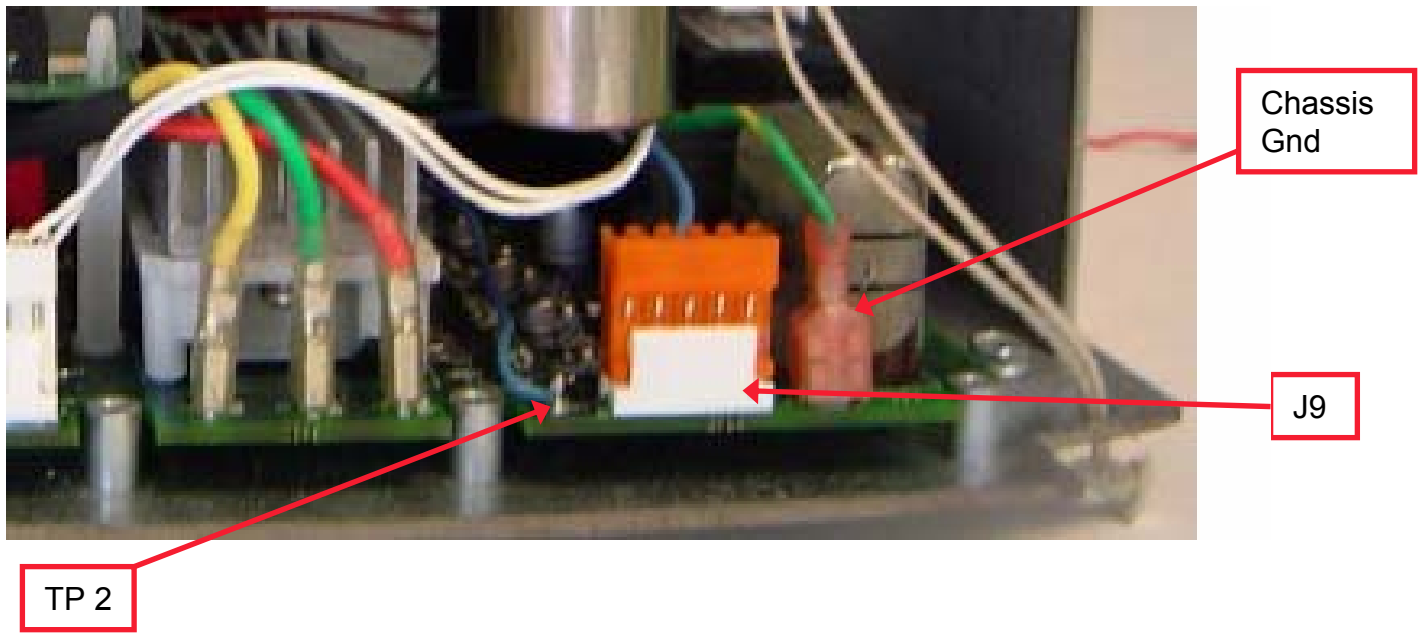
- Latch solenoid
- Motor brake
- Refrigeration
- Condenser fan

Power / Control PCB



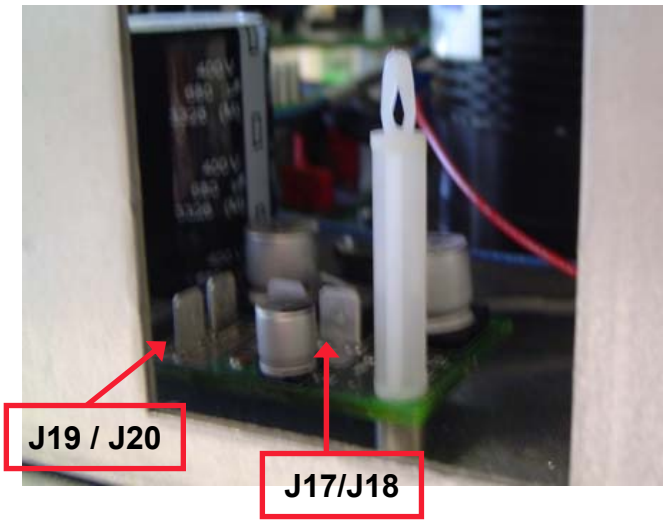
Control PCB Power TP's

- 115V AC System
  - J9 pin 1 = AC Line
  - J9 pin 2 + AC Neutral

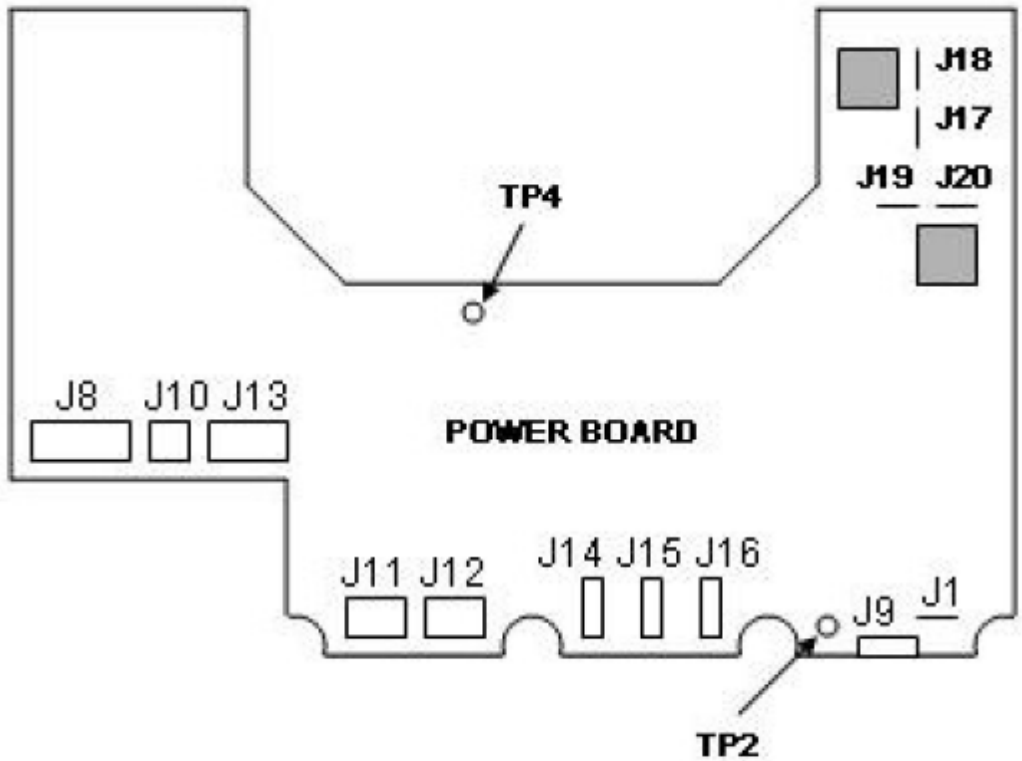


New Control PCB Power TP's

- New PCB



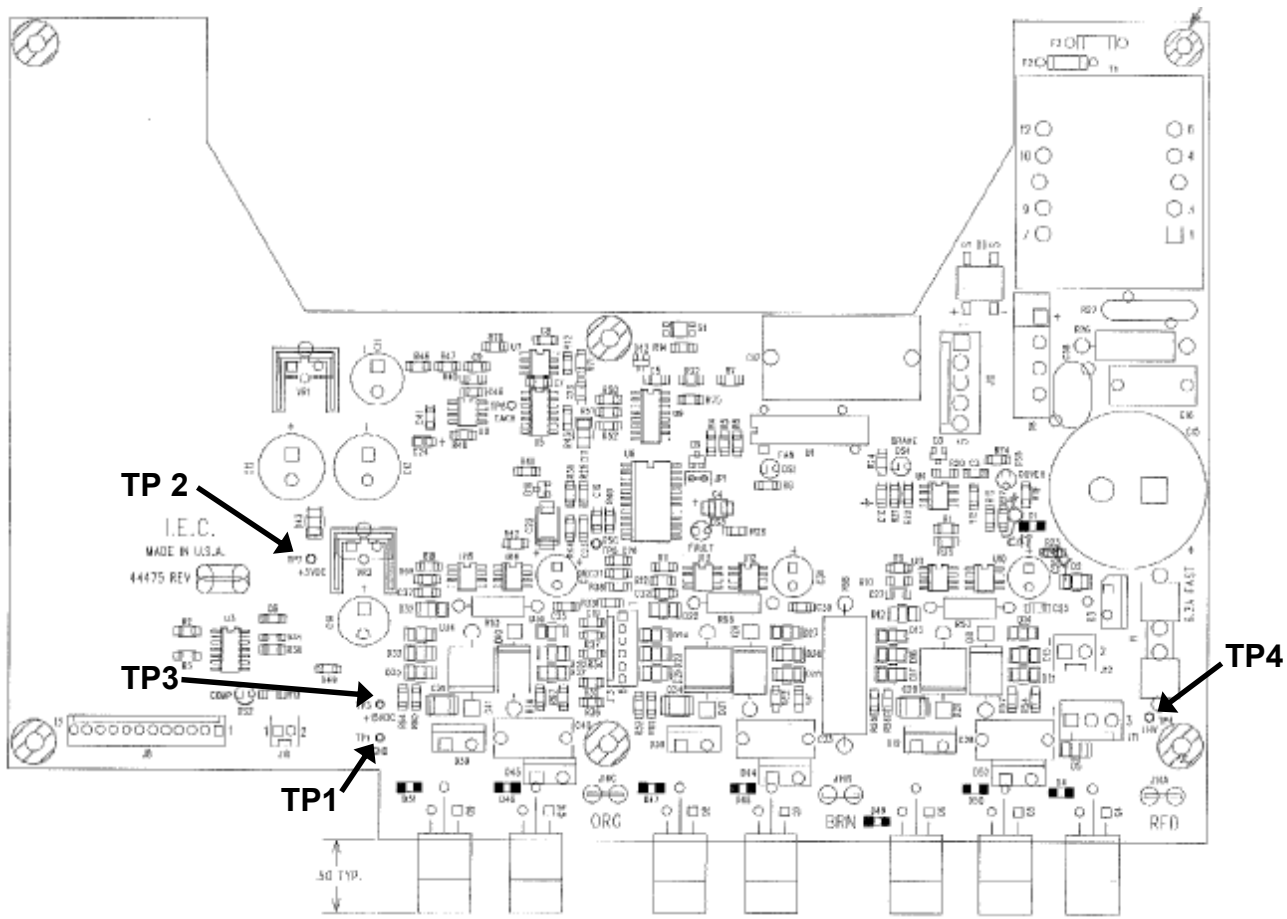
Test Points:	
*Ground	TP2
170VDC Min.159VDC	TP4
15VDC	J17-or-J18
5VDC (Logic)	J19-or-J20



Old Control PCB Power TP's

- Old PCB

Test Points	
Ground	TP1
5Vdc	TP2
15Vdc	TP3
HVDC (170Vdc)	TP4

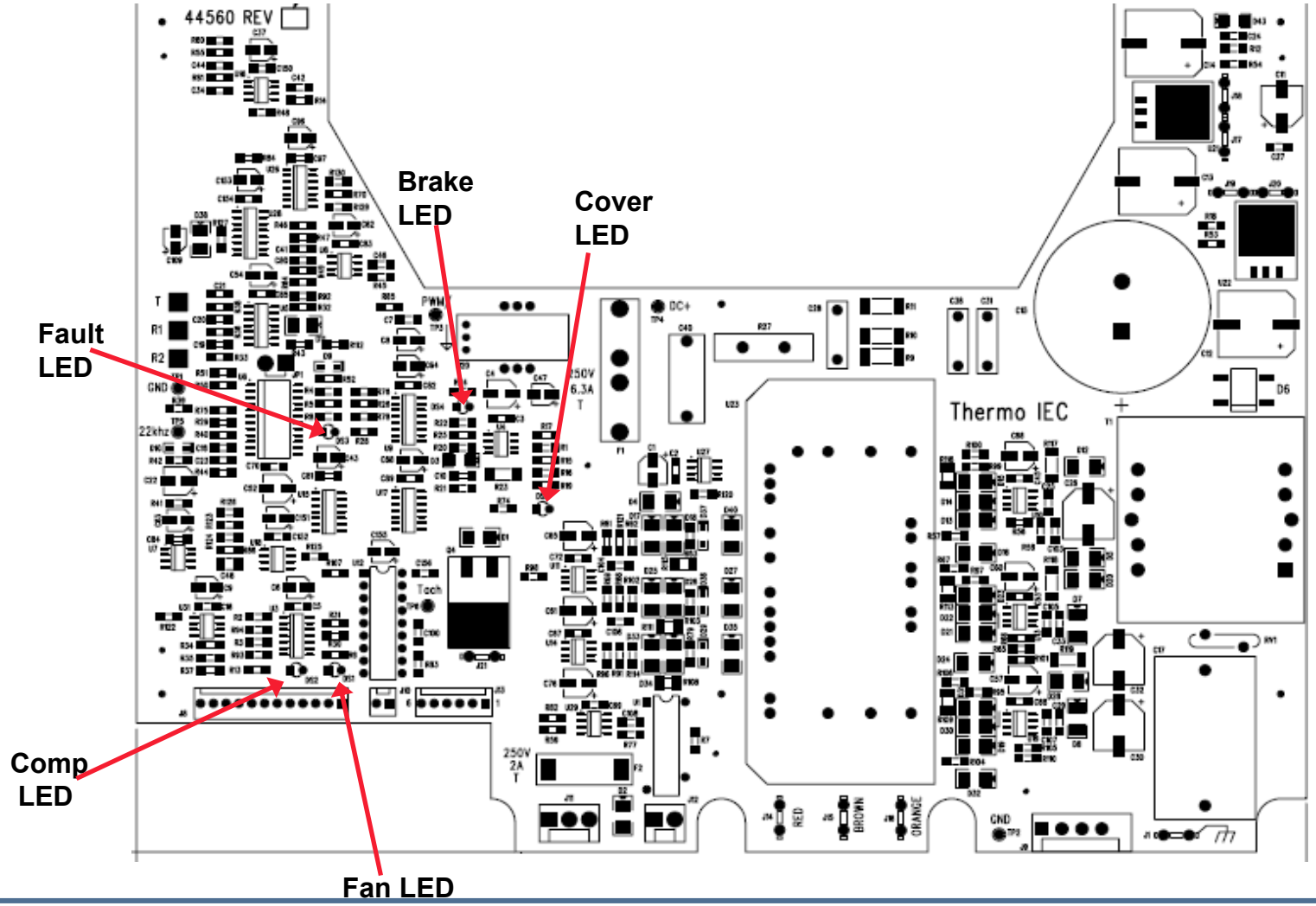


Control PCB LED's

- **Power PCB LEDs**
  - **FAN**
    This green LED Indicates that the condenser fan is activated.
  - **COMP**
    This green LED indicates that the refrigeration drive circuit is activated. The refrigeration drive circuit includes the compressor.
  - **FAULT**
    This red LED indicates when the motor is at rest. The FAULT LED measures the level of current being applied to the motor during acceleration. This LED is OFF at a steady state speed.
  - **BRAKE**
    The red LED indicates when the brake circuit is activated.
  - **COVER**
    This red LED indicates when the solenoid is activated.

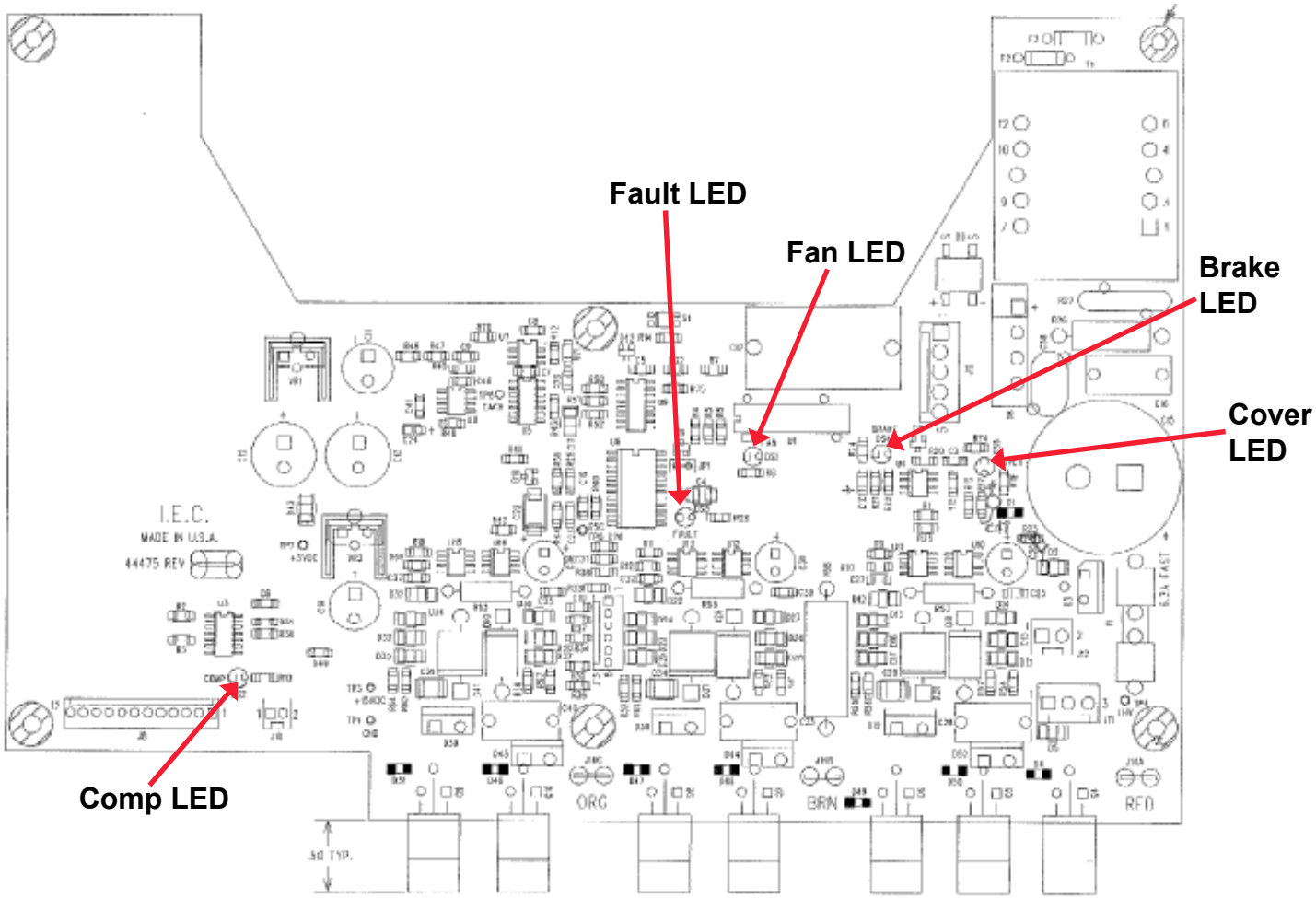
New Control PCB Power LED's

- New PCB

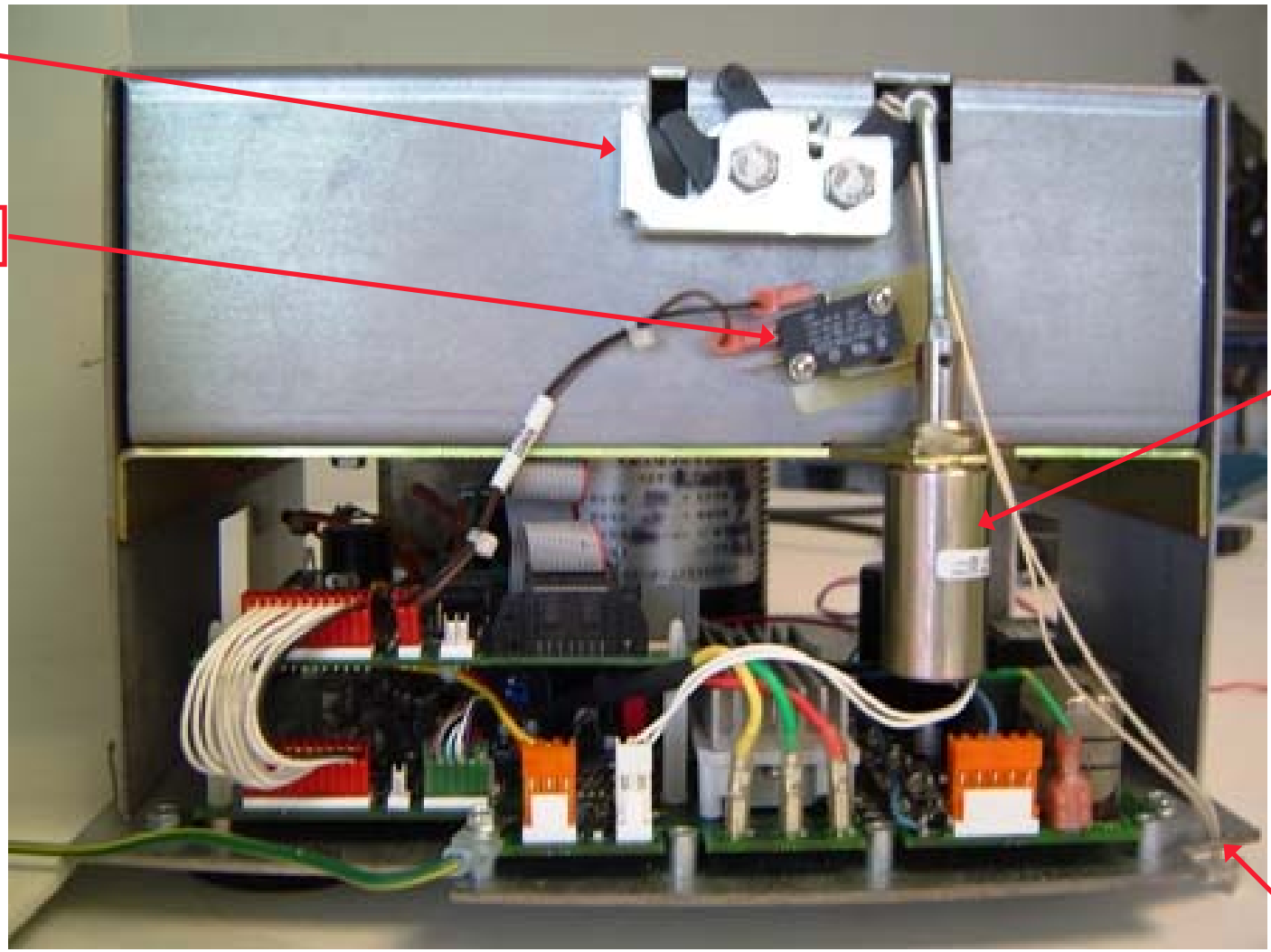


Old Control PCB Power LED's

- Old PCB

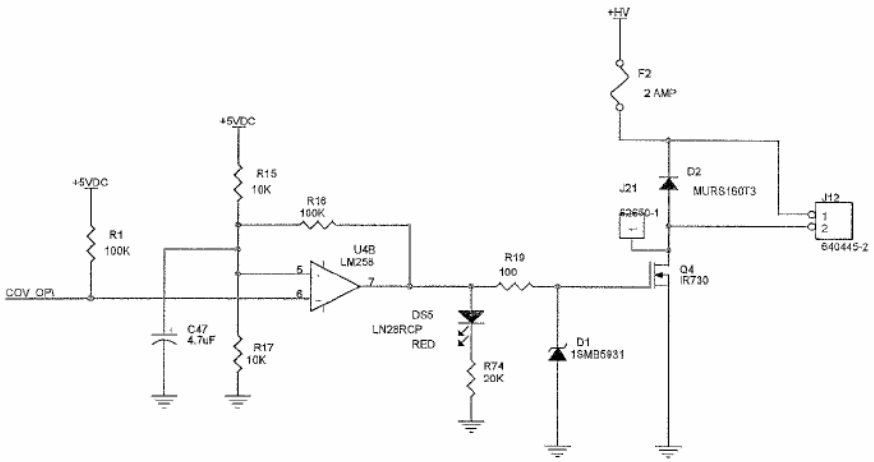


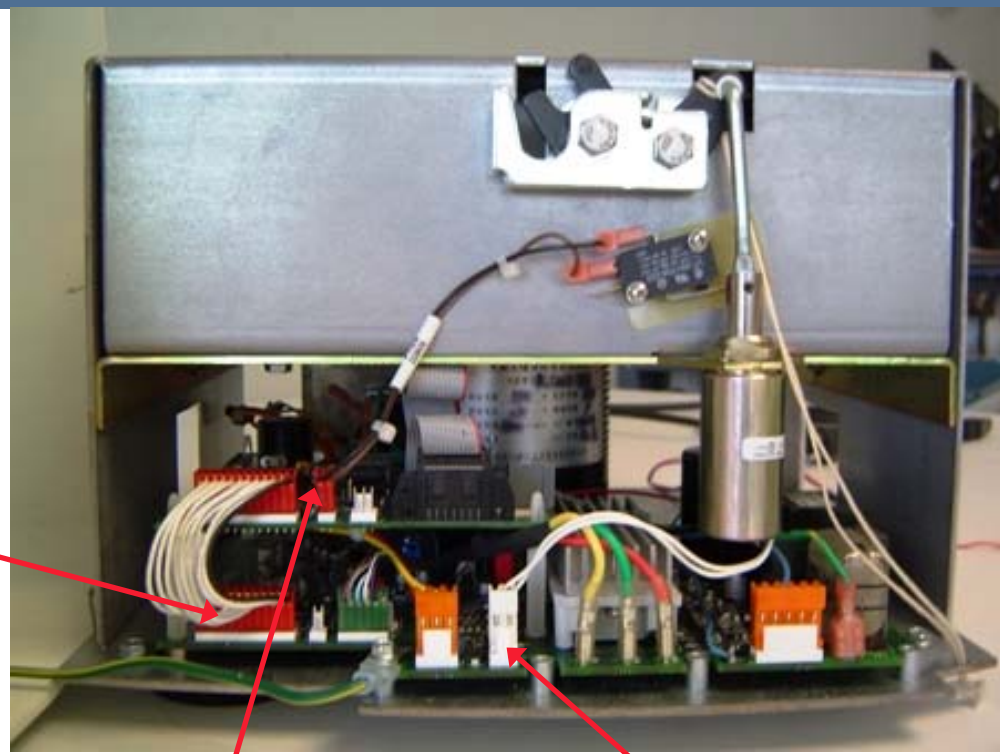
Micromax Interlock



Micromax Interlock

- To check the switch, disconnect J7. Open when lid = open, 0 Ohms when latch = closed.
- To check solenoid, disconnect J12. Solenoid resistance = 75-80 Ohms.
- To check voltage to solenoid, Meter leads on J12. Push lid open switch. Voltage = 130-170VDC pulse.

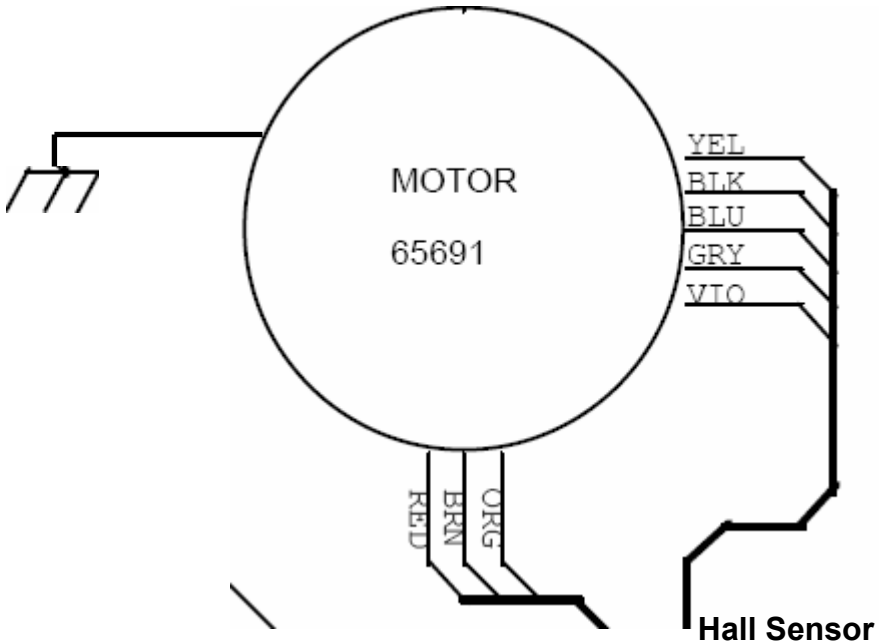




- Latch release active when speed 150RPM <
- J8 pin 2 goes low when cover switch pushed, LED should light

Micromax Motor/Drive

- The drive motor is a brushless DC motor with built in Hall effect speed sensors.
- Power is applied to the motor by the 3 phase sequencing of 6 MOSFET transistors through their associated drivers.
- Only one pair of the MOSFETS is on at any given time.

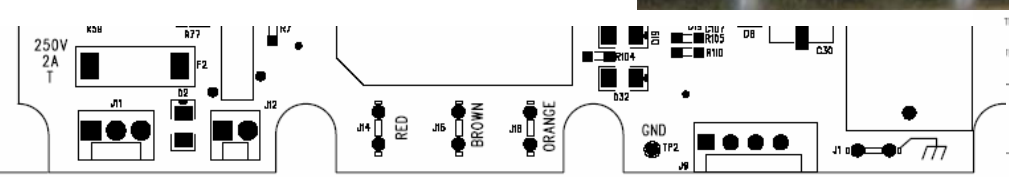


Micromax Motor Resistance

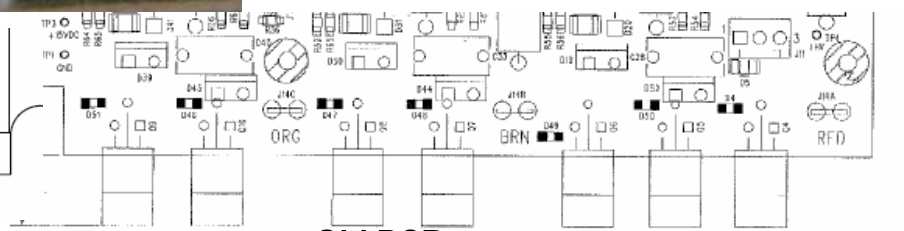
- To measure the resistance of the motor, use the following procedure:

1. Remove the lid and cabinet.
2. Remove connector J/P14A (red), J/P14B (brown), and J/P14C (orange) from power board.
3. Measure the resistance between each pair of wires (red/brown, red/orange, brown/orange).

Expected resistance value is approximately 1Ω. If an open circuit is detected, or if any lead does not read open with respect to ground, replace the motor.



New PCB

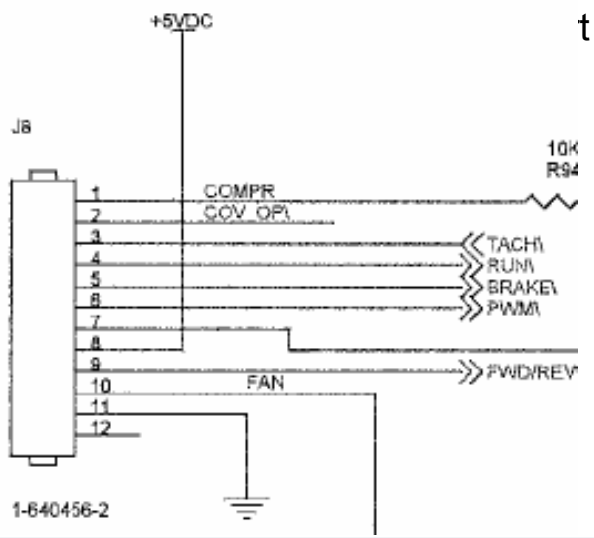


Old PCB

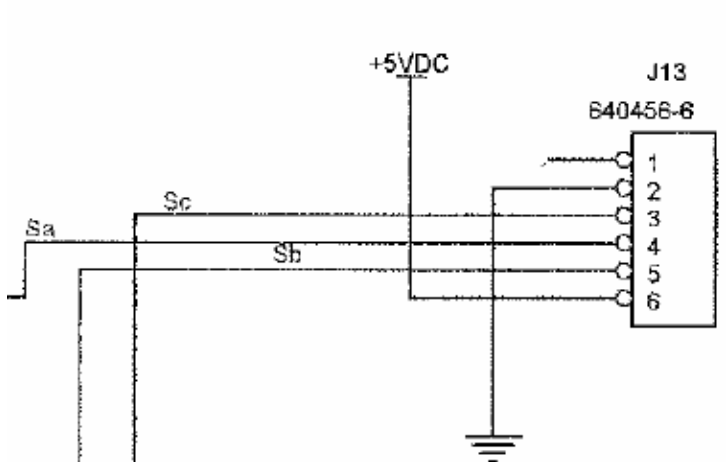
Micromax Motor Hall Sensors

- To verify the Hall sensors, use the following procedure:
  1. Open lid and manually turn rotor, check display for RPM. Verify display with a strobe. or
  2. Remove the lid and place the cabinet on its side, leaving the display board connected.
  3. Power to the speed sensor can be verified across J13, 2 and J13, 6 on Power PCB
  4. Turning the motor shaft slowly should produce a fluctuation between 0 and 5VDC (square wave) J13, 2 to J13, 3, J13, 2 to J13, 4, and J13, 2 to J13, 5
  5. Verify tach signal to Logic PCB on J8 , 3 of Power PCB

To Logic PCB

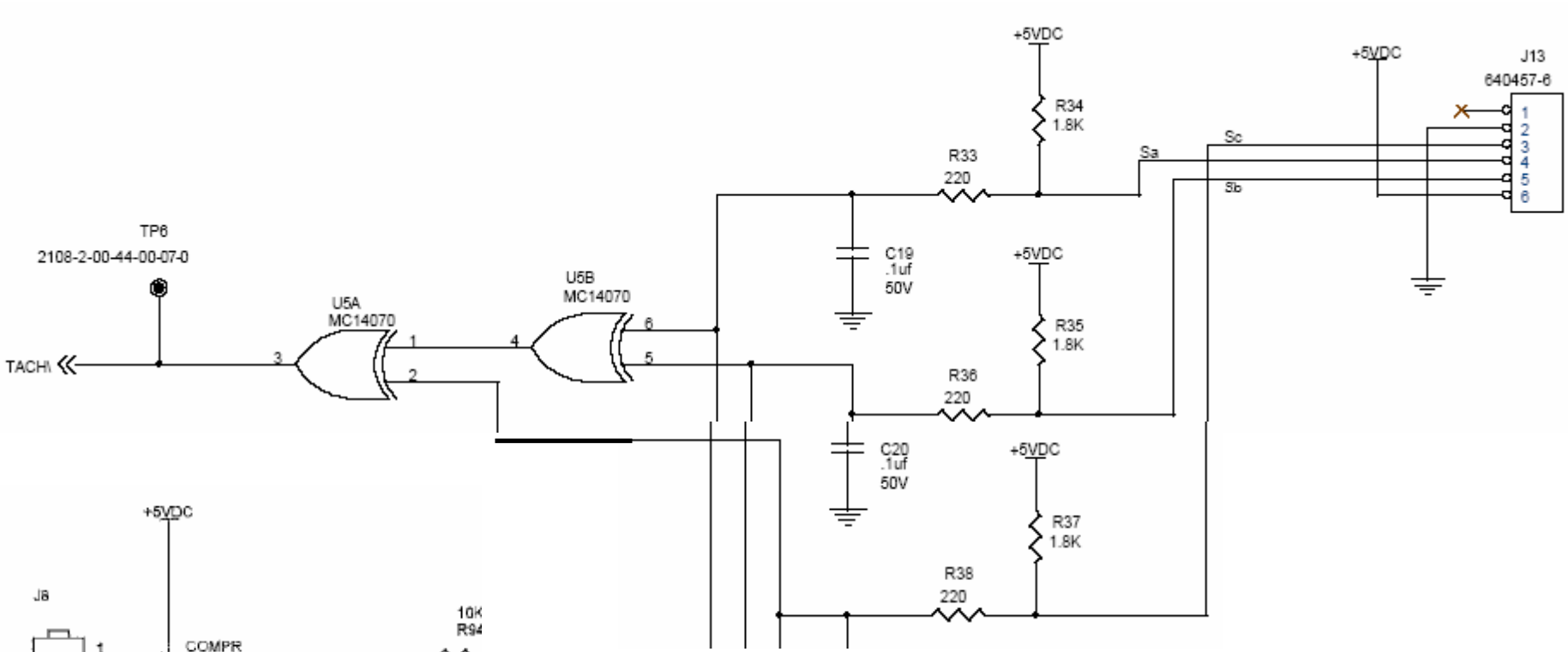


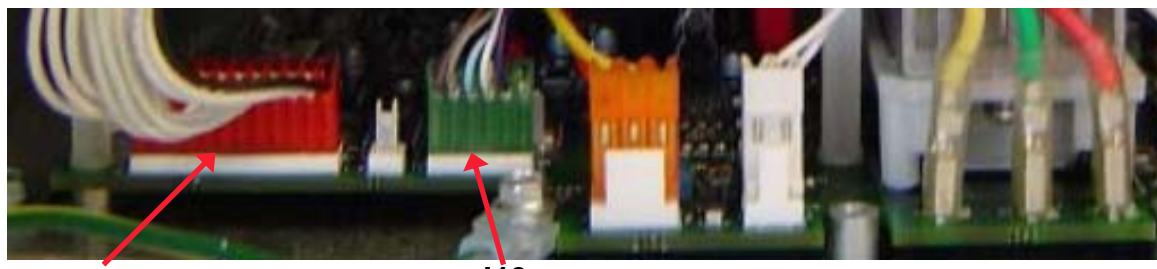
t of the motor assembly, and is not available separately.



From Hall Sensors

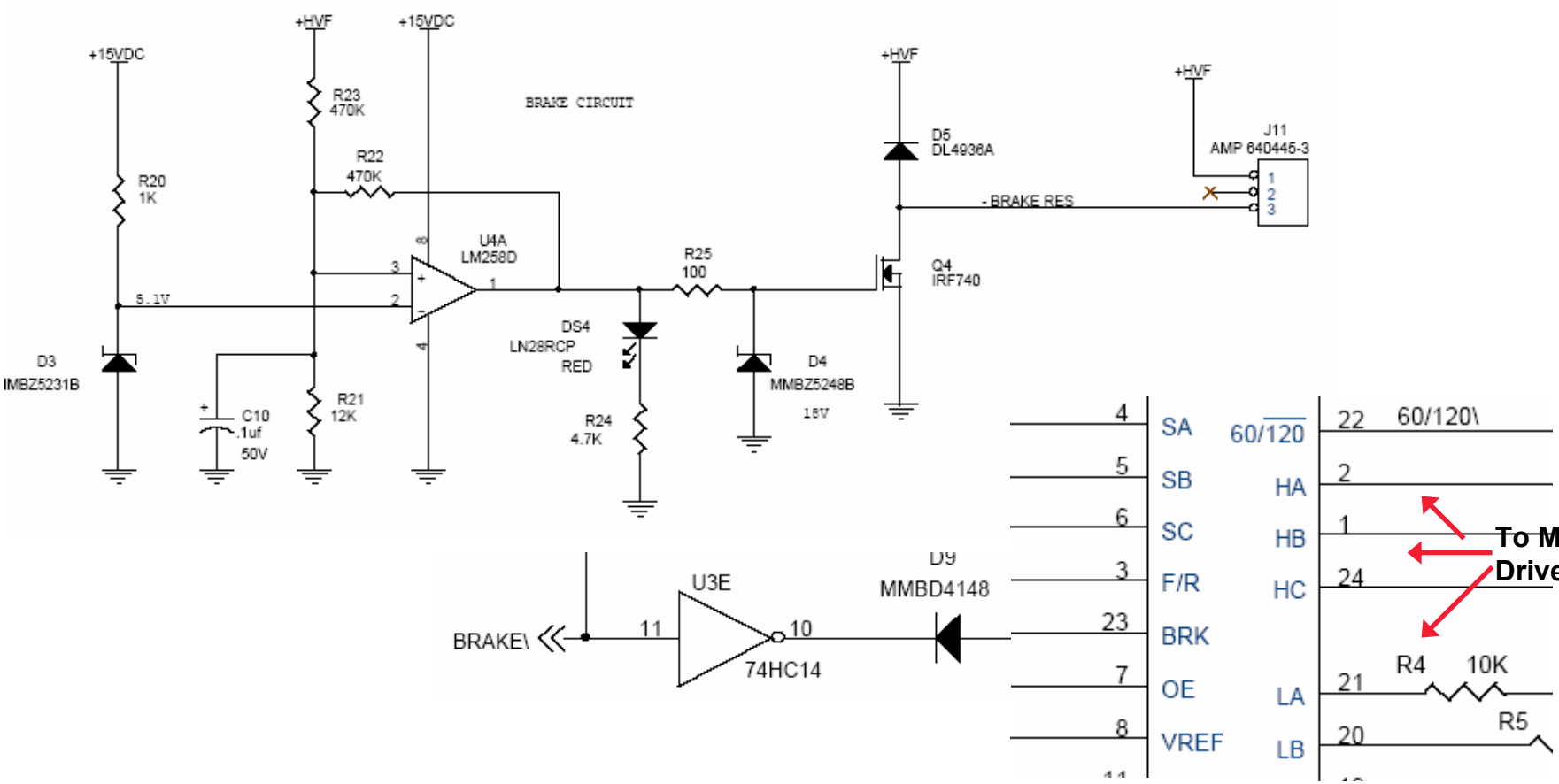
Micromax Motor Hall Sensors





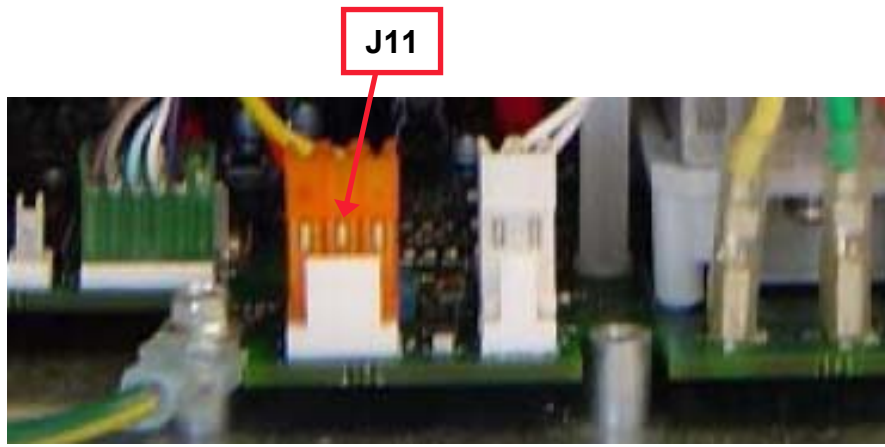
Micromax Motor Brake

- The brake applies reversed voltage to the motor during deceleration.
  - The brake requires service if, with a fully loaded rotor and operating at that rotor's maximum allowable speed, the deceleration time in the brake mode is not less than the deceleration time in coast (no brake).



Micromax Motor Brake

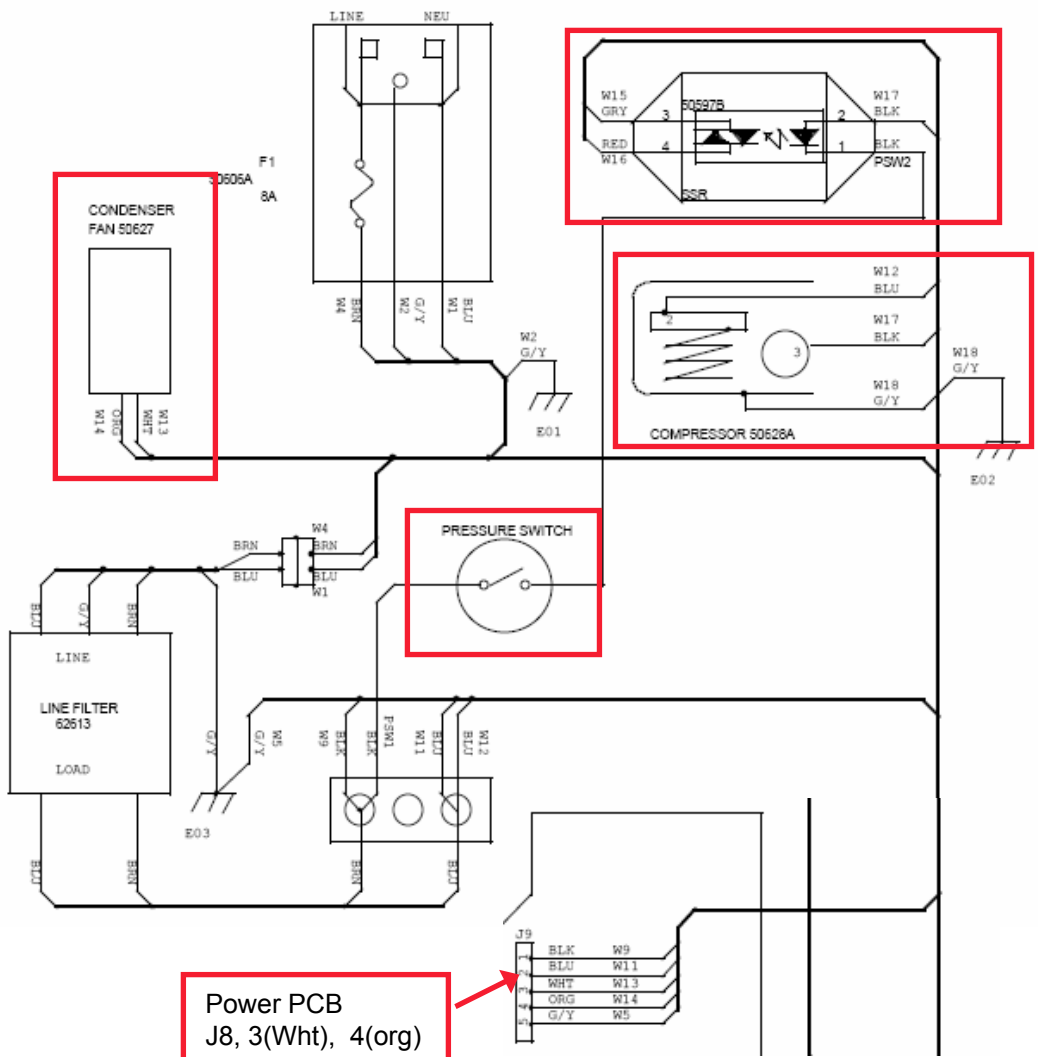
- Use this procedure to verify operation of the braking system:
  1. Remove the lid / cabinet and place the cabinet on its side, leaving the display board connected.
  2. Locate TP (GND) and J11, pin 3 (YEL) on the Power PCB.
  3. Verify DC braking voltage across these locations. Expected measurement should be approximately 170 VDC.
  4. Verify that a properly loaded rotor is installed. Select an appropriate speed and time, and start a run.
  5. During a run, this voltage should drop slightly (3 - 10 VDC).
  6. If voltage is not present, verify resistance of the brake resistor at J11 pins 1 and 3
     The expected value is approximately 50Ω. If the resistor is good, replace the Power PC board.

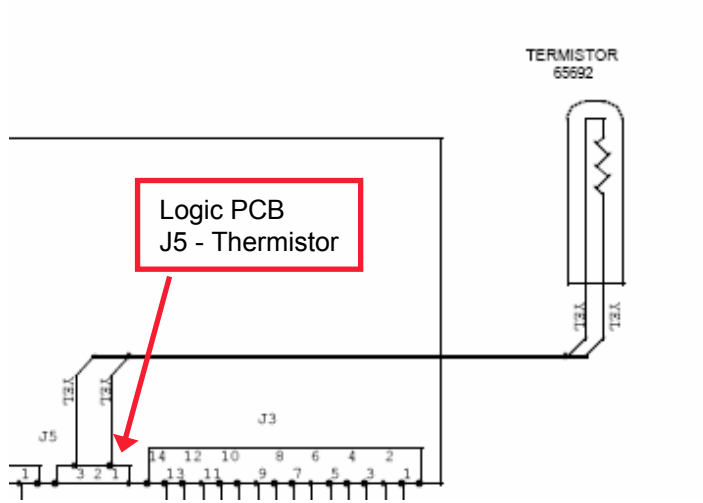


Micromax Refrigeration

- The Refrigerated Micromax is capable of maintaining a guard bowl temperature of 4° C at ambient temperatures up to 22° C.
- The unit should be able to maintain those temperatures within ± 2° C of the set point.
- The unit is charged with 3.9 oz. of HP62 (R-404A) refrigerant.
- The compressor in the refrigerated unit is controlled by a solid state relay.
- The refrigerated units also have a pressure switch that acts as a safety device for the refrigeration system.

Micromax Refrigeration Wiring

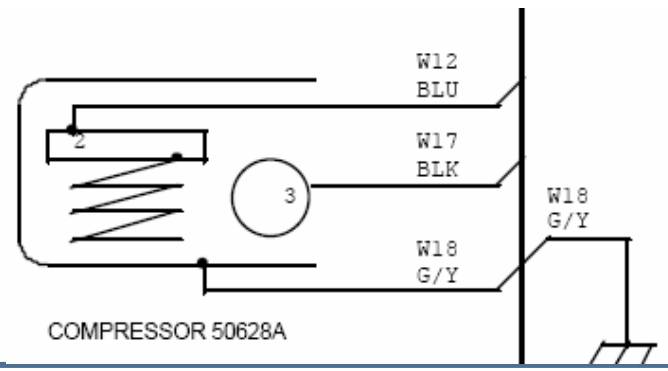


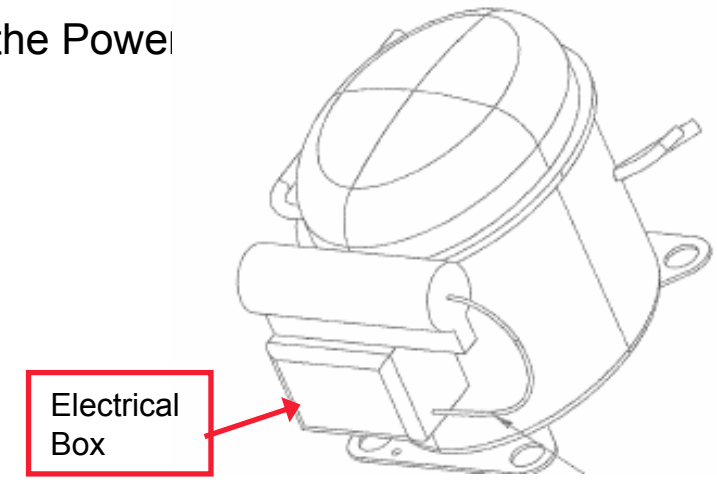


Micromax Refrigeration Compressor Voltage

Verify voltage to the compressor:

1. Unplug the unit.
2. Remove lid and place the cabinet on its side, leaving the control panel plugged in.
3. Plug in the unit.
4. Close the latch.
5. Set temperature below ambient. The compressor should turn on within one minute.
6. Use a voltmeter to measure the AC voltage at the electrical box across the BLU and BLK wires which go directly into the compressor.
7. The voltage applied to the compressor should be approximately 120 volts AC
8. If voltage is present, but the compressor does not start, check the starting capacitor.
9. If voltage is not present and the COMP LED on the Powe the solid state relay.



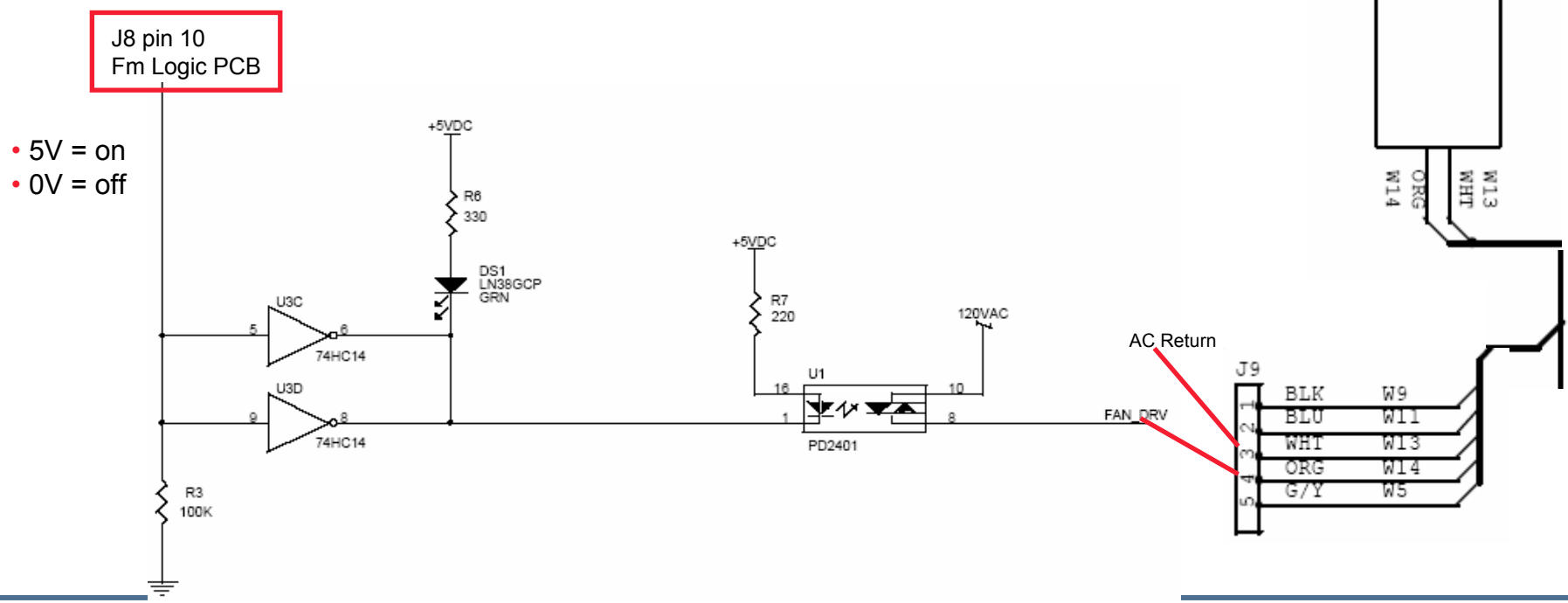


Micromax Refrigeration Condenser Fan

Condenser Fan Voltage:

1. Unplug the unit.
2. Remove lid and place the cabinet on its side, leaving the control panel plugged in.
3. Plug in the unit, Close the latch.
4. Set temperature below ambient.
5. Check FAN LED on Power PC board.
6. Measure across the two leads to the fan (WHT &ORG).
7. When cooling is called for, this should read approximately 120 VAC.

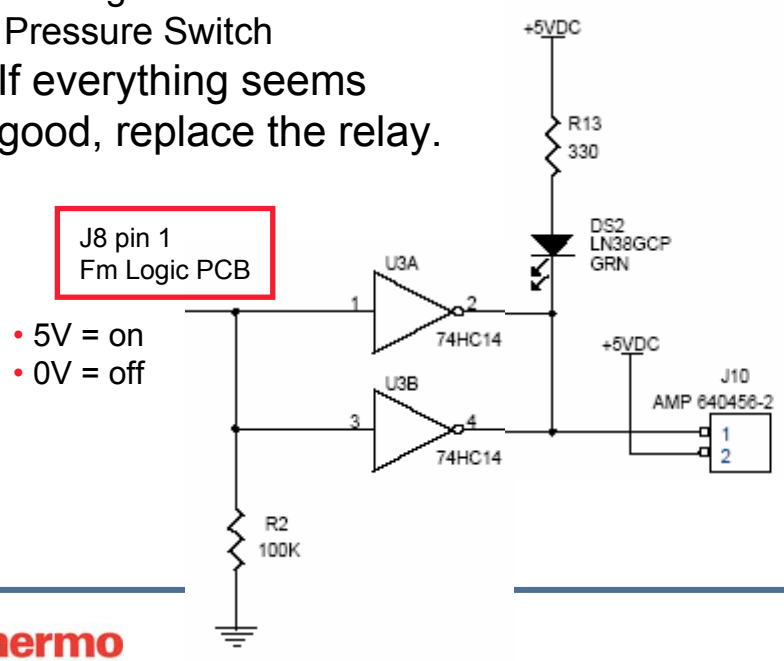
- 5V = on
- 0V = off

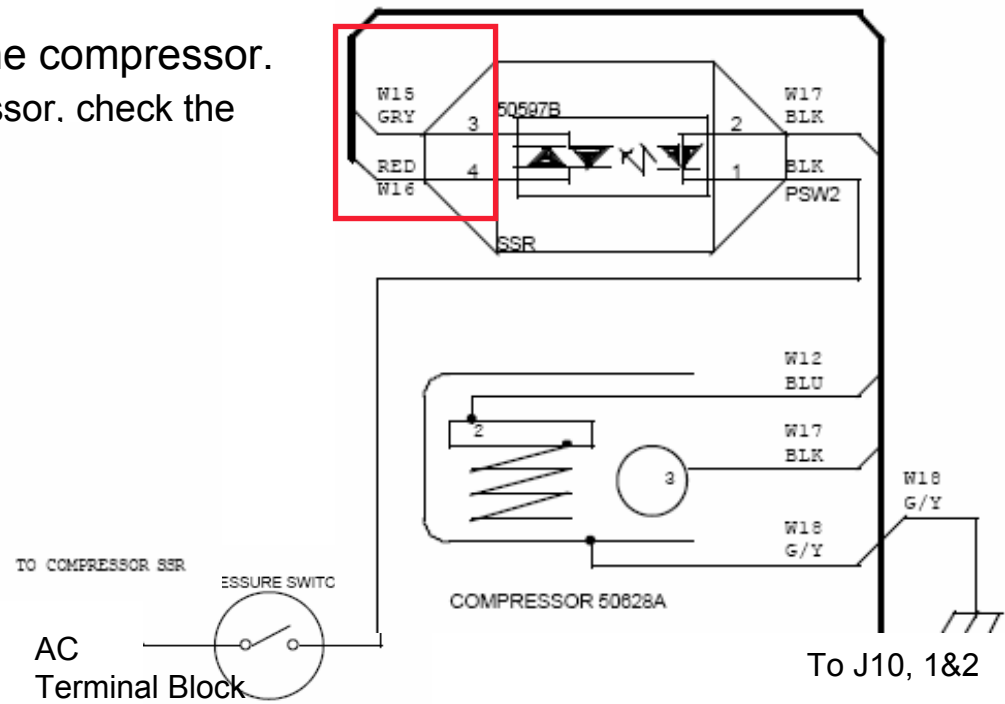


Micromax Refrigeration Solid State Relay

The solid state relay (SSR) powers the compressor on a low voltage signal from the Power PCB. To test the SSR, use the following procedure:

1. Unplug the unit.
2. Remove lid and place the cabinet on its side, leaving the control panel plugged in.
3. Plug in the unit. Close the latch.
4. Measure the DC voltage across J10 of the Power PCB, pins 1 (RED) and 2 (GRY).
   When the refrigeration system is activated (COMP LED - DS2 green is lit), there should be 5 VDC present. If not, replace the Power PCB.
5. If the 5 VDC is present, verify voltage at the compressor.
   If voltage of 120VAC is not found at the compressor, check the Pressure Switch
6. If everything seems good, replace the relay.





Micromax Refrigeration Thermistor

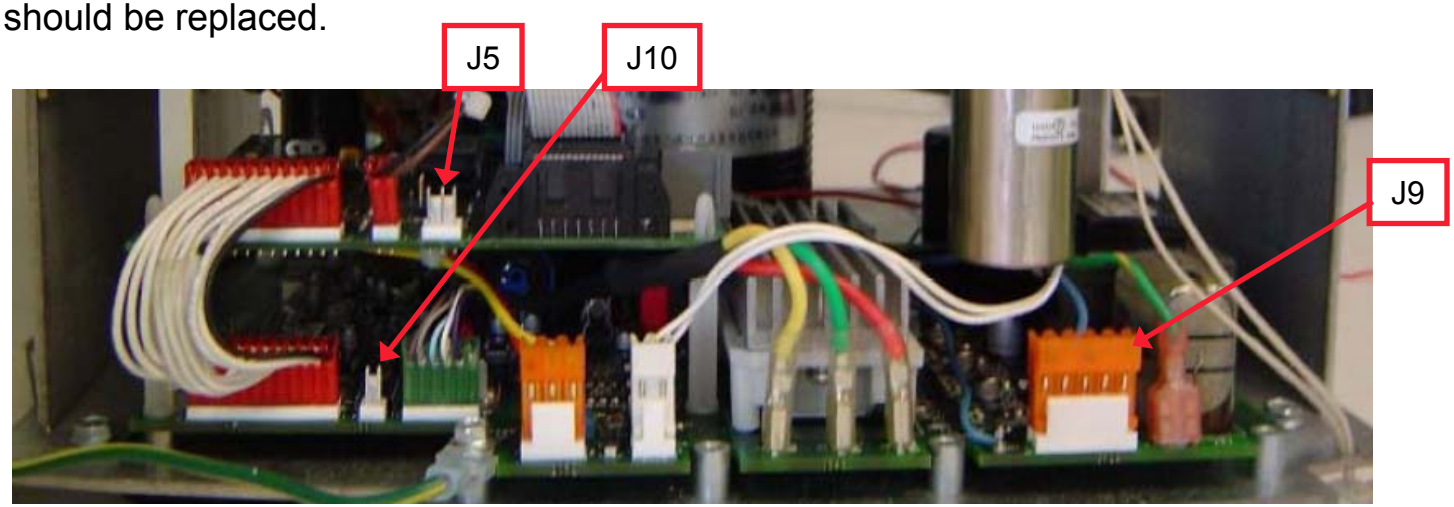
The thermistor is located inside the chamber of the refrigerated model, beneath the rotor. You can verify its operation by taking its resistance at various temperatures. Follow this procedure to do so:

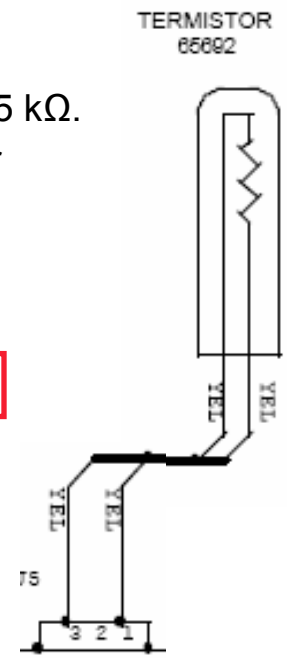
1. Open the cover.
2. Unplug the unit.
3. Remove the lid and cabinet).
4. Locate J/P5 connector, on the Logic board and disconnect it.
5. Measure the resistance across the two pins.

   At 25° C (approx. room temperature) the resistance should be 2.25 kΩ.

   At 0° C (achieved by packing ice around thermistor) the resistance should be 7.35 kΩ.

If these values are not verified, or if an open or short circuit are detected, the thermistor should be replaced.





Logic PCB

Warning Messages

- Lid The cover was not properly closed when the start button was pressed or the cover was opened during a run. Open cover to clear.
  1. Possible lid switch/lid switch logic failure Micromax Interlock

- PFL Power to the Centrifuge was lost during a run. Press stop to clear.
  1. Check External Power Circuit
     If no power to system, there would not be a display
     Micromax Power Distribution
     MicroMax TP's

- Head This appears if a run is started without loading a rotor into the chamber. Open cover to clear.
  1. Opening the cover resets this warning.
  2. This warning is disabled when slow acceleration is selected.

Error Codes

- Err1 Tachometer signal not present during a run. Unplug and power cycle to clear.
  1. Check Speed Sensor MMAX Hall Sensor
  2. Check Motor MMAX Motor
  3. Check Brake Resistor MMAX Motor Brake

- OSPd Overspeed. Rotation above 15,200 RPM has been detected. Unplug and power cycle to clear.
  1. Check Motor MMAX Motor
  2. Check Speed Sensor MMAX Hall Sensor
  3. Replace Power PCB

- rEFr Refrigeration failure. Measured temperature exceeds 45 degrees C. Unplug and power cycle to clear. Select temp below ambient and run.
  1. Check the Power PCB COMP LED (DS2 - green) should be lit. MMAX Control PCB LEDS
  2. Check the Condensing Unit MMAX Refrigeration
  3. Check Refrigeration Solid State Relay MM SSR
  4. Check Thermistor MM Thermistor

Error Codes

- **FSAFE** Hardware Fail-Safe feature timed out. Unplug and power cycle to clear.. Unplug and power cycle to clear,
  1. Repeat run, if error recurs, replace PCB's, (Processor failure)
- COP (Computer Operating Properly) watchdog feature is not enabled. Unplug and power cycle to clear.
  1. Repeat run, if error recurs, replace PCB's, (Processor failure)
- COPF COP watchdog feature has "hung up" or "crashed". Unplug and power cycle to clear.
  1. Repeat run, if error recurs, replace PCB's, (Processor failure)
- ILLOP Illegal Operation. Program has crashed. Unplug and power cycle to clear.
  1. Repeat run, if error recurs, replace PCB's, (Processor failure)
- UndFL Undefined Interrupt. May be the result of improper program execution, electrical noise or processor failure. Unplug and power cycle to clear.
  1. Verify program parameters
  2. Check noise on AC power in. MMAX Power
  3. Repeat run, if error recurs, replace PCB's